

WHAT IS CLAIMED IS:

1. A fuel cell, comprising:
an air electrode;
an electrolyte formed on at least a portion of the air electrode; and
5 a plasma sprayed ceramic-metal fuel electrode formed on at least a portion of the electrolyte.
2. The fuel cell of claim 1, wherein the air electrode composition comprises lanthanum manganite.
3. The fuel cell of claim 1, wherein the electrolyte composition comprises
10 yttria-stabilized zirconia.
4. The fuel cell of claim 1, wherein the ceramic-metal fuel electrode composition comprises nickel and zirconia.
5. The fuel cell of claim 4, wherein the fuel electrode composition comprises at least about 60% nickel and at least about 15% zirconia.
- 15 6. The fuel cell of claim 5, wherein the fuel electrode composition comprises at least about 70% nickel and at least about 20% zirconia.
7. The fuel cell of claim 4, wherein the fuel electrode composition comprises no more than about 85% nickel and no more than about 50% zirconia.
8. The fuel cell of claim 7, wherein the fuel electrode composition comprises
20 no more than about 80% nickel and no more than about 30% zirconia.
9. The fuel cell of claim 4, wherein a nickel graphite powder is used to obtain at least a portion of the nickel.

10. The fuel cell of claim 9, wherein the nickel graphite powder comprises at least about 60% nickel and at least about 15% graphite.

11. The fuel cell of claim 10, wherein the nickel graphite powder comprises at least about 70% nickel and at least about 20% graphite.

5 12. The fuel cell of claim 4, wherein a yttria stabilized zirconia powder is used to obtain at least a portion of the zirconia.

13. The fuel cell of claim 12, wherein the yttria stabilized zirconia powder comprises at least 5 mole percent of yttria.

10 14. The fuel cell of claim 13, wherein the yttria stabilized zirconia powder comprises at least 8 mole percent of yttria.

15. The fuel cell of claim 1, wherein the electrolyte composition comprises a solid oxide comprising a rare-earth element stabilized zirconia.

16. The fuel cell of claim 1, wherein the fuel cell further comprises an interconnect that interconnects a plurality of fuel cells.

15 17. The fuel cell of claim 16, wherein the interconnected fuel cells form a power generation system.

18. The fuel cell of claim 1, wherein the fuel cell further comprises a precursor layer formed between the electrolyte and the fuel electrode, the precursor layer composition comprising zirconia and having a thickness of about 5 μm to about 20 μm .

20 17. A method of manufacturing a fuel cell, comprising:
providing an air electrode;
arranging an electrolyte adjacent the air electrode; and

plasma spraying a ceramic-metal fuel electrode powder onto at least a portion of the electrolyte with a plasma spray gun.

18. The method of claim 17, wherein the powder has a gun feed rate of about 6 grams per minute to about 30 grams per minute, and a distance of about less than 4
5 inches between the gun and the electrolyte.

19. The method of claim 17, wherein the spray gun has a discharge voltage of about 30-60 volts, a current of about 400-900 amperes, and a power of about 10-40 kilowatts.

20. The method of claim 19, wherein the spray gun moves at a rate of about
10 400 mm/sec to about 700 mm/sec and the electrolyte makes about 2-40 revolutions around the spray gun to form the fuel electrode.